Effects of Certain Drying Treatments in Ginning on Fiber Properties and Spinning Performance of Southeastern Cotton, Crop of 1960

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CONTENTS

SUMMARY

The purpose of this study was to determine the effect of certain ginning treatments, primarily seed cotton drying, on fiber properties and spinning performance of Southeastern cotton from the 1960 crop. The specific object of the study was to determine differences in fiber and spinning qualities that are caused by gin drying cotton to a constant fiber moisture level by using various temperature-exposure combinations, and to determine the effectiveness of these combinations in producing an optimum fiber moisture content of 6 percent at the ginning point.

Machine-picked, hand-snapped, and hand-picked cottons used in the test had an average input trash content of 4.9, 10.9, and 3.0 percent, respectively. Good control of input fiber moisture at levels of 6, 10, and 8 percent was obtained by harvesting the cotton when the atmosphere had a prescribed relative humidity. The drying treatments were very effective in producing moisture contents within the range of 5 to 7 percent. Of 28 bales from the Clemson and Edisto Stations, in which the input fiber moisture had been controlled, only one had slightly less than 5 percent moisture content at the drier outlet.

The drying treatments had only a minor effect on grade index, which ranged overall from SGO Plus to SLM Plus for individual treatments. For combined locations and harvests, the grade index ranged from LM to SLM. The hand-picked control lots averaged about two-thirds of a grade higher than those subjected to different temperature-exposure combinations in the drying system. However, there was virtually no difference in grade for the dried lots regardless of the temperature-exposure combination used to produce 6 percent moisture at the ginning point.

The different drying treatments had even less effect on staple length than they had on grade index. The dried cotton approached the staple length of the control cotton in all cases—near $1\frac{3}{32}$ inches. No discernible differences in staple length were found between drying treatments that produced 6 percent moisture.

Most fiber and spinning properties were either not affected or affected only slightly by using various temperature-exposure combinations. Usually, when differences existed in fiber or spinning properties between treatments at one station, the same trend did not exist at the other stations. However, one trend did exist. With one exception, end breakage during spinning was less for cotton ginned at ambient temperature than for early- and late-harvested cotton subjected to the other treatments.

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INTRODUCTION

In recent years numerous large-scale research studies have been made to determine the spinning performance of cotton subjected to different ginning treatments. The spinning tests were made on a pilot-plant scale, using test-lots of one-half bale and larger. None of these tests included cotton grown in Southeastern United States.

The Southeast is historically important in cotton production, and more than 90 percent of the cotton spindles are in this area. Consequently, this area has certain natural advantages over other areas that also produce cotton. Shifts in the production of cotton to other areas have reduced the percentage of U.S. cotton grown in the Southeastern States. In recent years the proportionate extent of cotton grown here has ranged from 13 to 18 percent. Agricultural research and trade promotion have resulted in concentrating the production of cotton on the most suitable soils. These developments stabilized cotton production in the Southeast, and indications are that it will increase in this area.

Changing economic conditions and technological advancements in the production and marketing of cotton and in the manufacture of textiles have put new demands on the ginning and spinning industries. Rougher harvesting methods and shorter harvesting seasons caused backlogs of trashy, high-moisture cotton to accumulate at many gins and have taxed the ginner's ability to turn out a quality product. Competition from foreign countries and other fibers and increased processing rates in the mills are examples of economic changes that have placed greater demands on the cotton fiber.

This study was undertaken to ascertain the effect of certain ginning treatments, mainly the drying of seed cotton, on fiber properties and spinning performance of cotton grown in the Southeastern States in 1960.

Harvesting was supervised by engineers at the Agricultural Research Service's Southeastern Cotton Ginning Research Laboratory, Clemson, S.C. All cotton was ginned at this laboratory. All cotton samples were classed by a committee at the U.S. Department of Agriculture's AMS Cotton Classing Office, Columbia, S.C. Some of the fiber tests were performed by the Agricultural Research Service's pilot spinning plant at Clemson, S.C. Other fiber tests and all spinning tests were performed by the Textile Research Laboratories, Texas Technological College, Lubbock, Tex., under a contract with the U.S. Department of Agriculture.

OBJECTIVES

The major objective of the research was to determine the fiber- and spinning-quality differences caused by processing cotton at the gin to a constant fiber moisture level using various combinations of temperature and exposure to drying. Another objective was to help establish benchmarks of quality for Southeastern cotton, and thereby provide guides for production methods that will yield cotton fibers of maximum inherent quality. All treatment at the gin was designed so that cotton had the optimum fiber moisture content of 6 percent at the time of ginning. Incoming lots that had a fiber moisture content of 6 percent were ginned without heat in the drier for control purposes.

PROCEDURE

Harvesting

The cottons were all Coker 100–A variety, grown at three locations in South Carolina by the South Carolina Agricultural Experiment Station. Places where the cotton was grown and its method of harvest follow:

(1) Clemson Station (Simpson Farm near Pendleton, S.C.). The cotton grown here was harvested by use of a spindle-type picker and is designated as machine picked (*MP*).

(2) Edisto Station, Blackville, S.C. The cotton grown here was hand harvested in a relatively rough manner and is designated as hand snapped (*HS*).

(3) Pee Dee Station, Florence, S.C. The cotton grown here was hand harvested in a relatively clean manner and is designated as handpicked (*HP*).

The Clemson Station is in the Piedmont province. The Edisto and Pee Dee Stations are on the Coastal Plain and occupy soils that differ from those at the Clemson Station.

By using information available from previous tests, it was proposed to obtain cotton that had

the desired content of fiber moisture by harvesting it when the relative humidity was at prescribed levels. Cotton with the desired amount of moisture was to be obtained as follows:

(1) Six percent fiber moisture from field, by clean handpicking the cotton when atmospheric relative humidity was 50, percent.
(2) Eight percent fiber moisture from field, by hand snapping when the relative humidity was 60 percent, or by machine picking when the relative humidity was 50 percent.
(3) Ten percent fiber moisture from field, by hand snapping when the relative humidity was 78 percent, or by machine picking when the relative humidity was 70 percent.

Two seasons of harvest were proposed at each station as follows:

(1) Early—prior to September 21, or when 75 percent of the crop was open.
(2) Late—after September 21, or at least 2 weeks after the close of the early harvest season.

Actual harvesting dates were:

Clemson Station—Series I (early), October 13 to 15; Series II (late), October 26 to 27.
Edisto Station—Series III (early), September 12 to 14; Series IV (late), October 5 to 6.
Pee Dee Station—Series V (early), August 30 to September 16; Series VI (late), October 4 to 13.

Each lot of cotton was harvested from a plot that had not previously been harvested. For moisture retention purposes, it was desirable to harvest each series of lots the same day and to have plot sizes that were large enough to yield all the seed cotton needed for one series. Labor conditions at the Pee Dee Station made it impossible to harvest enough cotton at one time that had the desired fiber moisture for testing. However, sufficient bulk cotton was obtained at the Pee Dee Station to subject it to the same ginning conditions as were used for that obtained from the Edisto and Clemson Stations. The Pee Dee cotton had an initial fiber moisture content of 7.5 to 9.0 percent.

Harvesting cotton during periods of prescribed relative humidity was supplemented by testing the cotton frequently with a portable moisture meter to get samples that had the desired moisture content. Test lots were stored in bulk in covered trucks or trailers until they were processed at the gin.

Lot sizes consisted of approximately 1,000 pounds of seed cotton and would yield at least 300 pounds of lint for large-scale spinning tests.

Ginning

The projected moisture control by seven ginning treatments was designed to produce a fiber-moisture content of 6 percent at the ginning point (table 1). The tested cotton was sent through gin machinery in the following sequence:

(1) Wagon suction telescope.
(2) Separator.
(3) Seed cotton weighing hopper-dump on floor.
(4) Suction telescope inside gin.
(5) Separator.
(6) Automatic feed control.
(7) Roller electrodes (continuous fiber-moisture measurement).
(8) Tower drier. (See table 1 for drying treatments.)
(9) Separator.
(10) Roller electrodes (continuous fiber-moisture measurement).

TABLE 1.—*Projected moisture control for 7 ginning treatments*

Treatment No.	Method of harvest for [1]—						Gin drying conditions				
	Clemson cotton		Edisto cotton		Pee Dee cotton		Fiber moisture at input	Drier inlet temperature	Duration of exposure	Number of exposures	Fiber moisture at output
	Early; Series I	Late; Series II	Early; Series III	Late; Series IV	Early; Series V	Late; Series VI					
							Percent	*° F.*	*Seconds*		*Percent*
T_1	HP	HP	HP	HP	HP	HP	6±1	[2]	3 to 16	1	6±1
T_2	MP	MP	HS	HS	HP	HP	10±1	210	3	2	6±1
T_3	MP	MP	HS	HS	HP	HP	10±1	175	12	2	6±1
T_4	MP	MP	HS	HS	HP	HP	10±1	140	16	2	6±1
T_5	MP	MP	HS	HS	HP	HP	8±1	210	3	1	6±1
T_6	MP	MP	HS	HS	HP	HP	8±1	175	12	1	6±1
T_7	MP	MP	HS	HS	HP	HP	8±1	140	16	1	6±1

[1] HP means handpicked; HS, hand snapped; MP, machine picked.
[2] Ambient.

(11) Three-cylinder large drum cleaner-extractor.
(12) Seven-saw extractor-cleaner-feeder.
(13) Roller electrodes (continuous fiber-moisture measurement).
(14) Ninety-saw gin stand with reciprocating cleaner. Feeder was adjusted for a production rate of 7.5 pounds of lint per saw per hour.
(15) Condenser.
(16) Roller electrodes (continuous lint-moisture measurement).
(17) Flat bale press.

The seed cotton input control and the gin stand feeder were balanced so that flow through the system was continuous, with a minimum of overflow or no overflow between the drying and cleaning systems.

Drier inlet temperatures of 140°, 175°, or 210° F. were obtained from a gas-fired heater equipped with a modulating gas valve control. All heater controls were turned off for ginning under ambient conditions (T_1).

For the 210° F. inlet temperature, Y-valves in the 16-inch cotton piping were adjusted to completely bypass the tower drier. This resulted in 3 seconds of exposure to the drying air in 130 feet of cotton piping only. For the 175° F. inlet temperature, the Y-valves were adjusted for 12 shelves in the tower drier plus 187 feet of cotton piping and for a total exposure of 12 seconds in the drying air. Exposure of 16 seconds in drying air at 140° F. inlet temperature was obtained by adjusting the Y-valves for 24 shelves in the tower drier plus 245 feet of cotton piping.

Records were made of original lot weights (approximately 1,000 pounds per test lot); of trash weights from the three-cylinder cleaner, the gin stand feeder, the gin huller front, and the moting system; of seed weight (roll dumped after each lot); and of lint weight. Records were also made of the elapsed times for the drying, cleaning, and ginning.

Dry bulb and wet bulb atmospheric conditions were recorded at the beginning and end of each test lot. Portable hygrothermographs recorded temperature and relative humidity at the gas heater inlet and inside the gin.

Air temperature and fiber moisture were monitored throughout the drying and ginning operations by a continuous electronic measuring system. In addition, fiber moisture was checked with a portable meter at the outlets of the drying and cleaning systems, at the feeder apron, and at the lint slide.

Samples of seed cotton, trash, seed, and lint were obtained for test lots at the various stages of processing for the evaluation of moisture and quality. At least five samples were taken from each lot to obtain a value that would be representative of the lot.

The detailed sequence of ginning equipment used for each experimental treatment is shown in table 2. The lint cleaners were bypassed in order to eliminate the variable of lint cleaning from the study. This naturally resulted in somewhat lower grade index than would have been obtained by including lint cleaning in the treatments.

Fiber Tests

As the bales were opened, composite samples of raw cotton were taken throughout each bale and blended into one sample. The blended sample was given the Suter-Webb array, Fibrograph, Pressley strength, and Fibronaire tests. A separate sample was used for the waste test. All fiber tests were made under controlled atmospheric conditions of 70° F. and 65 percent relative humidity.

Mill Processing

The bales were delivered to the opening room, and the ties were removed 12 hours before cotton was processed through the picker. This allowed the cotton to "bloom" and condition.

Each bale was fed through an opening and picking line consisting of one hopper feeder, an Aldrich [1] horizontal opener, and a one-process picker. The one-process picker consisted of two sections. The first section was equipped with a blade beater; the second, with a Kirschner beater. This opening and picking line was set up to produce a 14-ounce picker lap. The picker laps were moved to the cardroom and conditioned for a minimum of 12 hours before they were carded.

The carding operation was set up to produce a 50-grain sliver at a production rate of 9½ pounds per hour. During the carding of each lap, separate nep counts were made by two technicians. Three nep boards were taken at each of four equal intervals during the carding of the lap. The first board was taken when the lap was one-fourth completed.

Two processes of drawing were used, feeding six ends into breaker drawing and eight ends into finisher drawing, with an operating speed of 125 feet per minute. The first process produced a 53-grain sliver; the second, a 55-grain sliver.

The roving process was set up to produce 1.25 hank roving when using a 1.30 twist multiplier and a spindle speed of 1,025 r.p.m.

In the spinning process, 40s filling yarn with a 3.75 twist multiplier was spun with a spindle speed of 11,000 r.p.m. from a single creel of 1.25 hank roving. New travelers were used for each lot, and the spinning frames were allowed to run for 30 minutes before an ends-down count was

[1] Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture or an endorsement by the Department over other products not mentioned.

TABLE 2.—*Sequence of ginning equipment used in the southeastern ginning-spinning study, 1960*

Experimental ginning treatment	Initial fiber moisture	Exposure and temperature of drying air	Processed through—			
			3-cylinder large drum cleaner-extractor	7-saw extractor-cleaner-feeder	90-saw gin with reciprocating cleaner	Flat bale press
	Percent					
T_1	[1] 6	3 to 16 seconds; ambient temperature	Yes	Yes	Yes	Yes.
T_2	10	3 seconds; 210° F.; 2 passes	Yes	Yes	Yes	Yes.
T_3	10	12 seconds; 175° F.; 2 passes	Yes	Yes	Yes	Yes.
T_4	10	16 seconds; 140° F.; 2 passes	Yes	Yes	Yes	Yes.
T_5	8	3 seconds; 210° F.; 1 pass	Yes	Yes	Yes	Yes.
T_6	8	12 seconds; 175° F.; 1 pass	Yes	Yes	Yes	Yes.
T_7	8	16 seconds; 140° F.; 1 pass	Yes	Yes	Yes	Yes.

[1] Handpicked control.

made. This interval served as a break-in period for the travelers and also produced yarn for sizing, so that the correct draft gear could be determined.

The spinning test for each lot consisted of running a full doff. This required 8½ hours of continuous frame operation, or 8,160 spindle-hours. Ends down were recorded in 15-minute cycles, and these data were combined so that ends down per 1,000 spindle-hours could be determined.

The outline of processing sequence was:

(1) Opening equipment: One blender feeder; Aldrich horizontal opener.
(2) Picker: Two-section, one-process picker.
(3) Carding: Four standard cards.
(4) Drawing: Two-process.
(5) Roving: One slubber 9 x 4½; Whitin Interdraft.
(6) Spinning: Single creel roving spun on Duo-Roth system of drafting; four 240-spindle frames.

Supplemental data on ginning conditions during the tests are shown in appendix tables 13 to 18.

ANALYSES OF RESULTS

Results were not statistically analyzed because the study included the drying of cotton from various amounts of moisture to a common level of moisture. In addition, acceptable replications were not available for an analysis of variance. Values in the tables are averages of five subsamples, and the conclusions were drawn from trends shown by these averages.

Seed Cotton

The total trash content in wagon samples of incoming seed cotton was determined by the fractionation process (table 3). The trash content of the carefully handpicked control lots for treatment T_1 averaged 2.2 percent at Clemson, 1.6 percent at Edisto, and 3.0 percent at Pee Dee.

The high-moisture (10 percent) and medium-moisture (8 percent) machine-picked lots at Clemson had an overall average trash content of 4.9 percent, which is relatively low for machine-picked cotton. This trash consisted primarily of large leaf elements and burs.

Harvesting at the Edisto Station consisted of hand snapping the cotton. Early in the season when the cotton is fluffy and burs and other plant elements have not yet deteriorated, this method of harvesting approaches handpicking, as is reflected by the trash content (table 3). Late in the season, hand snapping is less selective and results in total trash content of 15 to 20 percent. About 90 percent of this trash was burs, which were easily removed by the three-cylinder large drum cleaner-extractor. Average trash content for the two harvests at Edisto was 10.9 percent.

Trash content of cotton at the Pee Dee Station averaged 3.0 percent overall, which is indicative of careful handpicking practices. This trash was composed principally of burs and large leaf elements.

After cleaning, the seed cotton control lots for treatment T_1 had almost a uniform content of trash (table 4). At the feeder apron, trash in these control lots averaged 0.4 percent at Clemson, 0.4 percent at Edisto, and 0.6 percent at Pee Dee. After drying and cleaning, the high-moisture and medium-moisture seed cotton lots contained relatively low levels of trash, averaging 1.6 percent at Clemson, 1.6 percent at Edisto, and 0.4 percent at Pee Dee. This trash consisted of leaf elements with some grass in the machine-picked lots.

Good control of fiber moisture in the incoming seed cotton was obtained by harvesting it when the atmosphere had the prescribed relative humidity (table 5). Except the Pee Dee samples that could not be harvested under prescribed conditions, cotton having the desired fiber moisture was obtained with little variation. Average fiber moisture in the wagon samples of Clemson and Edisto cotton was 7.0 percent for the control lots, 9.9 percent for the high-moisture lots, and 8.6 percent for the medium-moisture lots. The fiber moisture

TABLE 3.—*Total trash content in wagon samples of incoming seed cotton—fractionation method*

Treatment No.[1]	Clemson samples			Edisto samples			Pee Dee samples		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Control lots: T_1	1. 8	2. 6	2. 2	1. 9	1. 4	1. 6	1. 8	4. 1	3. 0
High-moisture lots:									
T_2	3. 9	6. 6	5. 2	2. 6	21. 6	12. 1	2. 2	3. 5	2. 8
T_3	4. 1	6. 3	5. 2	2. 8	17. 0	9. 9	1. 4	3. 6	2. 5
T_4	3. 6	6. 3	5. 0	2. 3	18. 1	10. 2	1. 4	3. 8	2. 6
Medium-moisture lots:									
T_5	4. 8	5. 0	4. 9	4. 5	15. 9	10. 2	1. 5	4. 2	2. 8
T_6	4. 2	4. 2	4. 2	2. 5	19. 8	11. 2	2. 4	4. 5	3. 4
T_7	4. 4	5. 6	5. 0	2. 7	21. 4	12. 0	3. 1	4. 3	3. 7

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

TABLE 4.—*Total trash content of seed cotton samples from feeder apron—fractionation method*

Treatment No.[1]	Clemson samples			Edisto samples			Pee Dee samples		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Control lots: T_1	0. 3	0. 5	0. 4	0. 5	0. 4	0. 4	0. 5	0. 8	0. 6
High-moisture lots:									
T_2	1. 3	2. 7	2. 0	. 5	2. 5	1. 5	. 4	. 4	. 4
T_3	1. 2	2. 2	1. 7	. 6	1. 7	1. 2	. 3	. 4	. 4
T_4	1. 2	2. 1	1. 6	. 6	2. 6	1. 6	. 2	. 4	. 3
Medium-moisture lots:									
T_5	1. 0	2. 1	1. 6	. 8	2. 4	1. 6	. 4	. 6	. 5
T_6	1. 1	1. 7	1. 4	. 7	2. 7	1. 7	. 5	. 5	. 5
T_7	1. 3	2. 1	1. 7	. 7	2. 7	1. 7	. 6	. 7	. 6

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

desired in these lots was 6.0 percent, 10.0 percent, and 8.0 percent, respectively.

Moisture

The temperature-exposure combinations used in the study were designed to produce lint that had an optimum moisture content of 6 percent. The drying combinations selected were very effective in reducing the moisture content of cotton to the optimum range of 5 to 7 percent (table 6).

TABLE 5.—*Fiber moisture in the wagon samples of seed cotton*

Treatment No.[1]	Clemson samples			Edisto samples			Pee Dee samples		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Control lots: T_1	8. 0	6. 8	7. 4	7. 0	6. 2	6. 6	9. 4	9. 8	9. 6
High-moisture lots:									
T_2	10. 7	10. 2	10. 4	9. 2	10. 3	9. 8	8. 1	7. 9	8. 0
T_3	10. 0	10. 0	10. 0	9. 5	9. 6	9. 6	7. 7	8. 1	7. 9
T_4	10. 4	9. 8	10. 1	9. 8	9. 7	9. 8	7. 5	8. 9	8. 2
Medium-moisture lots:									
T_5	8. 2	9. 2	8. 7	8. 5	7. 1	7. 8	8. 0	8. 8	8. 4
T_6	9. 1	10. 0	9. 6	8. 4	7. 7	8. 0	8. 4	8. 7	8. 6
T_7	8. 8	10. 1	9. 4	8. 9	7. 2	8. 0	8. 5	9. 0	8. 8

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

TABLE 6.—*Actual moisture in cotton at selected stages of the ginning system*

Season of harvest and treatment No. [1]	Drier inlet temperature	Exposure time	Times exposed	Fiber moisture at drier inlet	Fiber moisture at drier outlet [2]	Fiber moisture at feeder apron	Lint moisture at lint slide
CLEMSON STATION							
Early season:	°F.	Seconds		Percent	Percent	Percent	Percent
T_1	70	16	1	8. 01	6. 72	6. 65	6. 02
T_2	210	3	2	10. 67	6. 33; 5. 54	5. 32	5. 24
T_3	175	12	2	10. 05	6. 28; 5. 40	5. 16	5. 21
T_4	140	16	2	10. 37	6. 97; 6. 02	6. 27	6. 25
T_5	210	3	1	8. 25	5. 59	5. 41	5. 09
T_6	175	12	1	9. 09	5. 70	5. 68	5. 83
T_7	140	16	1	8. 80	6. 43	6. 40	6. 56
Late season:							
T_1	65	3	1	6. 75	6. 66	6. 39	6. 08
T_2	210	3	2	10. 19	6. 65; 5. 66	5. 41	5. 08
T_3	175	12	2	9. 95	6. 21; 5. 32	4. 91	5. 05
T_4	140	16	2	9. 78	6. 64; 6. 03	5. 73	5. 51
T_5	210	3	1	9. 23	6. 26	6. 32	5. 84
T_6	175	12	1	10. 04	6. 03	6. 12	5. 98
T_7	140	16	1	10. 10	6. 99	7. 00	6. 71
EDISTO STATION							
Early season:							
T_1	84	16	1	7. 00	6. 76	6. 53	6. 50
T_2	210	3	2	9. 20	5. 48; 4. 75	4. 72	4. 72
T_3	175	12	2	9. 50	5. 19; 5. 03	5. 17	5. 02
T_4	140	16	2	9. 80	6. 85; 6. 04	5. 85	6. 06
T_5	210	3	1	8. 50	5. 67	5. 62	5. 97
T_6	175	12	1	8. 40	5. 80	5. 87	6. 10
T_7	140	16	1	8. 90	6. 70	6. 70	7. 06
Late season:							
T_1	83	3	1	6. 15	5. 86	5. 63	5. 61
T_2	210	3	2	10. 27	6. 32; 5. 75	5. 56	5. 35
T_3	175	12	2	9. 65	6. 37; 5. 51	5. 32	5. 52
T_4	140	16	2	9. 68	7. 14; 6. 55	6. 18	6. 30
T_5	210	3	1	7. 14	5. 06	4. 84	4. 91
T_6	175	12	1	7. 72	5. 49	5. 27	5. 39
T_7	140	16	1	7. 23	5. 94	5. 77	5. 82
PEE DEE STATION							
Early season:							
T_1	45	16	1	9. 37	7. 27	7. 70	6. 69
T_2	210	3	2	8. 08	5. 80; 5. 09	4. 97	4. 29
T_3	175	12	2	7. 69	5. 78; 5. 03	4. 95	4. 20
T_4	140	16	2	7. 46	5. 56; 5. 21	5. 12	4. 47
T_5	210	3	1	7. 98	5. 62	5. 36	5. 02
T_6	175	12	1	8. 41	5. 52	5. 50	4. 74
T_7	140	16	1	8. 52	5. 84	5. 94	5. 70
Late season:							
T_1	63	16	1	9. 78	7. 14	6. 92	6. 01
T_2	210	3	2	7. 89	5. 17; 4. 34	4. 26	3. 55
T_3	175	12	2	7. 97	4. 90; 4. 30	4. 34	3. 91
T_4	140	16	2	8. 89	5. 67; 4. 87	5. 00	4. 30
T_5	210	3	1	8. 84	5. 80	5. 50	4. 87
T_6	175	12	1	8. 66	5. 13	5. 44	4. 98
T_7	140	16	1	9. 04	5. 49	5. 77	5. 69

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

[2] For treatments T_2, T_3, and T_4, the first value is the fiber moisture at outlet of drier on first pass through the drying system; the second value, fiber moisture at outlet of drier on second pass through the drying system.

Only 1 bale out of the 28 bales harvested under prescribed conditions at the Clemson and Edisto Stations had less than 5 percent moisture at the drier outlet. At the feeder apron, only 3 bales had less than 5 percent moisture; at the lint slide, only 2 had less than 5 percent. In the two latter stages of ginning, the moisture content was affected by ambient temperature and relative humidity because cotton was air handled in a loose, fluffy condition. All deviations below the moisture level of 5 percent were less than 0.3 of a percent in magnitude. All cases in which the output moisture was below the optimum level were associated with fiber moisture inputs that were slightly below the desired level. In general, good control of input moisture levels of 6, 10, and 8 percent was obtained.

Grade and Staple

The grade index (Middling White=100) for early- and late-harvested cotton at the three locations is shown in table 7. Grade index reflects differences in market value and provides a method for averaging the grade for a number of individual lots.

Grade index ranged from a low of 80.0 to a high of 97.0 for individual treatments at the three locations. Because the T_1 lots were carefully harvested under the most favorable conditions and were ginned without heat in the drier and with a minimum of seed cotton cleaning, they represent the best procedure for retention of quality under conditions prevailing at time of test. These control lots had average grade indexes of 93.0 at Clemson, 92.0 at Edisto, and 89.0 at Pee Dee.

The average grade index for the machine-picked, high- and medium-moisture lots (T_2 to T_7) at Clemson was 81.2. This compared with the grade index of 93.0 for the hand-picked control (T_1). A similar comparison at Edisto Station showed that the hand-snapped test lots had an average grade index of 88.1 and the control, 92.0. At the Pee Dee Station, where the input moisture content was uniform for all treatments, the control lot had an average grade index of 89.0 and the dried test lots, 91.4. All test lots for each harvest at Pee Dee had uniform moisture content, and this indicates that drying had beneficial effects that improved the grade. The average drying effect was an increase of about one-third of a grade.

The grade index for each ginning treatment at each of the three locations was averaged, and the results are shown in figure 1. In both the high- and medium-moisture test lots, a slight trend toward a lower grade index was noted as the gin drying treatment progressed to a lower inlet temperature and a corresponding increase in exposure time. All grade indexes were in the LM to SLM range. The control lots averaged about two-thirds of a grade higher than those subjected to different temperature-exposure combinations in the drying system.

The staple length for early- and late-harvested cotton at the three locations is given in table 8. Staple lengths differed but little, and for individual treatments ranged from 33.6 to 36.2 thirty-seconds of an inch. The cotton in machine-picked and hand-snapped treatments from Clemson and Edisto had staple lengths closely grouped around 35.0, or $1\frac{3}{32}$ inches. The staple length of the control treatment at Clemson was 35.1, compared with 34.9 for the average of the dried treatments. That of the control treatment at Edisto was 35.3, compared with 35.4 for the dried treatments. That of the control treatment at Pee Dee was 34.5,

TABLE 7.—*Grade index of lint samples from 7 ginning treatments*

(Middling=100; Strict Low Middling, 94; Low Middling, 85; and Strict Good Ordinary, 76)

Treatment No.[1]	Clemson samples			Edisto samples			Pee Dee samples		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
Control lots: T_1	94. 0	92. 0	93. 0	94. 0	90. 0	92. 0	89. 0	89. 0	89. 0
High-moisture lots:									
T_2	81. 8	80. 0	80. 9	94. 6	85. 0	89. 8	97. 0	89. 0	93. 0
T_3	80. 0	80. 0	80. 0	93. 6	85. 0	89. 3	97. 0	89. 0	93. 0
T_4	81. 8	80. 0	80. 9	94. 6	81. 0	87. 8	97. 0	89. 0	93. 0
Medium-moisture lots:									
T_5	85. 4	80. 0	82. 7	94. 6	80. 0	87. 3	94. 8	89. 0	91. 9
T_6	85. 4	80. 0	82. 7	[2] 89. 0	82. 0	85. 5	90. 6	86. 6	88. 6
T_7	80. 0	80. 0	80. 0	94. 0	83. 8	88. 9	93. 2	85. 0	89. 1

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; and T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

[2] Composite reduced to SLM Lt. Sp. (89) because color was M Lt. Sp. (97), Leaf SLM and Prep SLM.

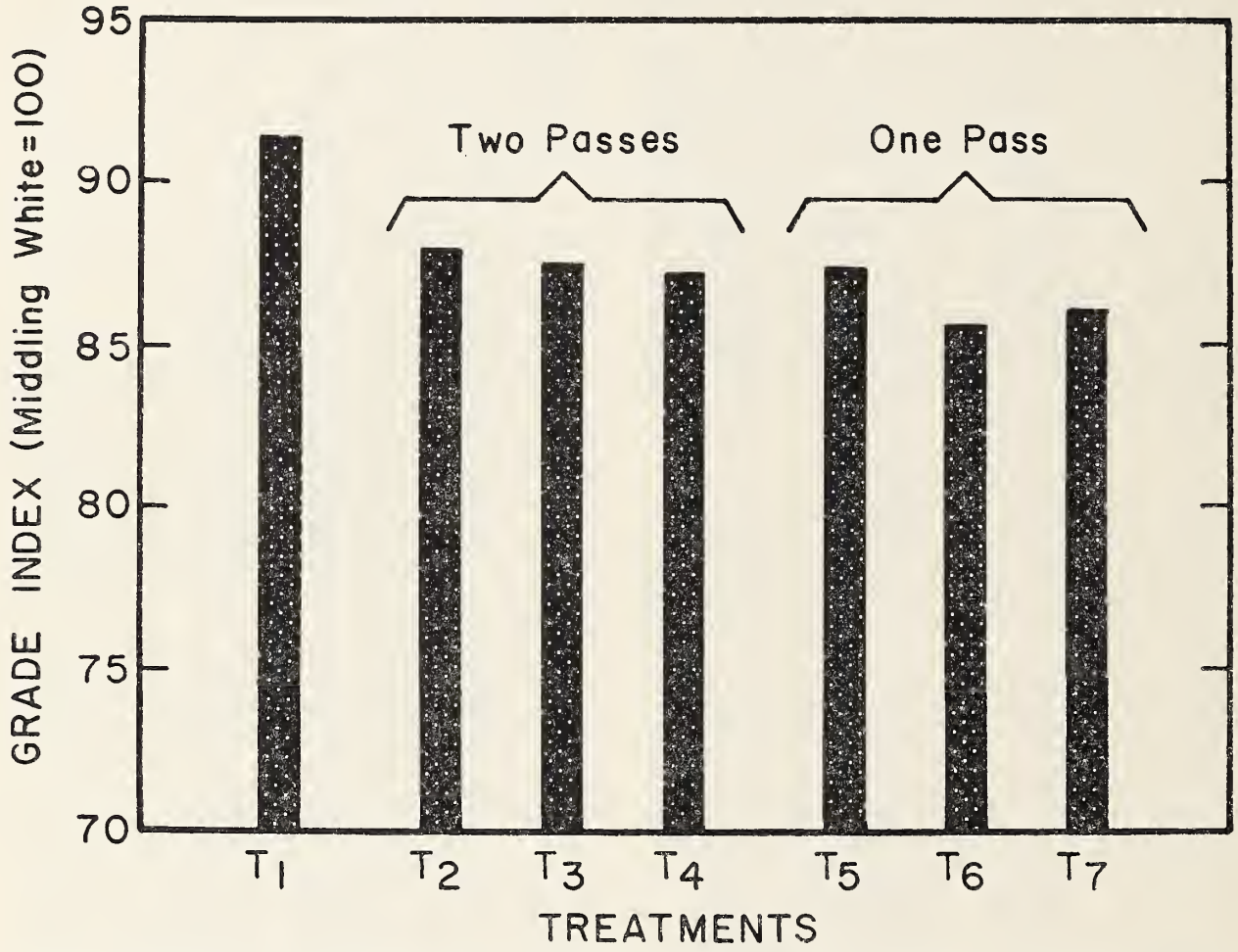

FIGURE 1.—The effects of temperature-exposure combinations in gin drying on the grade index of cotton—average of results obtained from three stations, 1960. The T_1 samples were exposed 3 to 16 seconds to drying air at ambient temperature. The other samples were passed through drier as shown under the following conditions: T_2 and T_5 at 210° F. for 3 seconds; T_3 and T_6 at 175° F. for 12 seconds; and T_4 and T_7 at 140° F. for 16 seconds.

TABLE 8.—*Staple length of lint samples from 7 ginning treatments*

Treatment No.[1]	Clemson samples			Edisto samples			Pee Dee samples		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
	32d	*32d*	*32d*	*32d*	*32d*	*32d*	*32d*	*32d*	*32d*
Control lots: T_1	34. 6	35. 6	35. 1	36. 0	34. 6	35. 3	35. 0	34. 0	34. 5
High-moisture lots:									
T_2	34. 2	35. 8	35. 0	36. 0	35. 0	35. 5	34. 0	33. 6	33. 8
T_3	34. 2	36. 0	35. 1	35. 4	35. 0	35. 2	33. 8	33. 8	33. 8
T_4	34. 2	35. 8	35. 0	36. 0	35. 0	35. 5	33. 8	34. 0	33. 9
Medium-moisture lots:									
T_5	34. 2	35. 2	34. 7	36. 0	34. 6	35. 3	34. 2	34. 0	34. 1
T_6	34. 2	35. 0	34. 6	35. 6	35. 0	35. 3	34. 0	34. 0	34. 0
T_7	34. 6	35. 0	34. 8	36. 2	35. 0	35. 6	34. 0	33. 8	33. 9

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; and T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

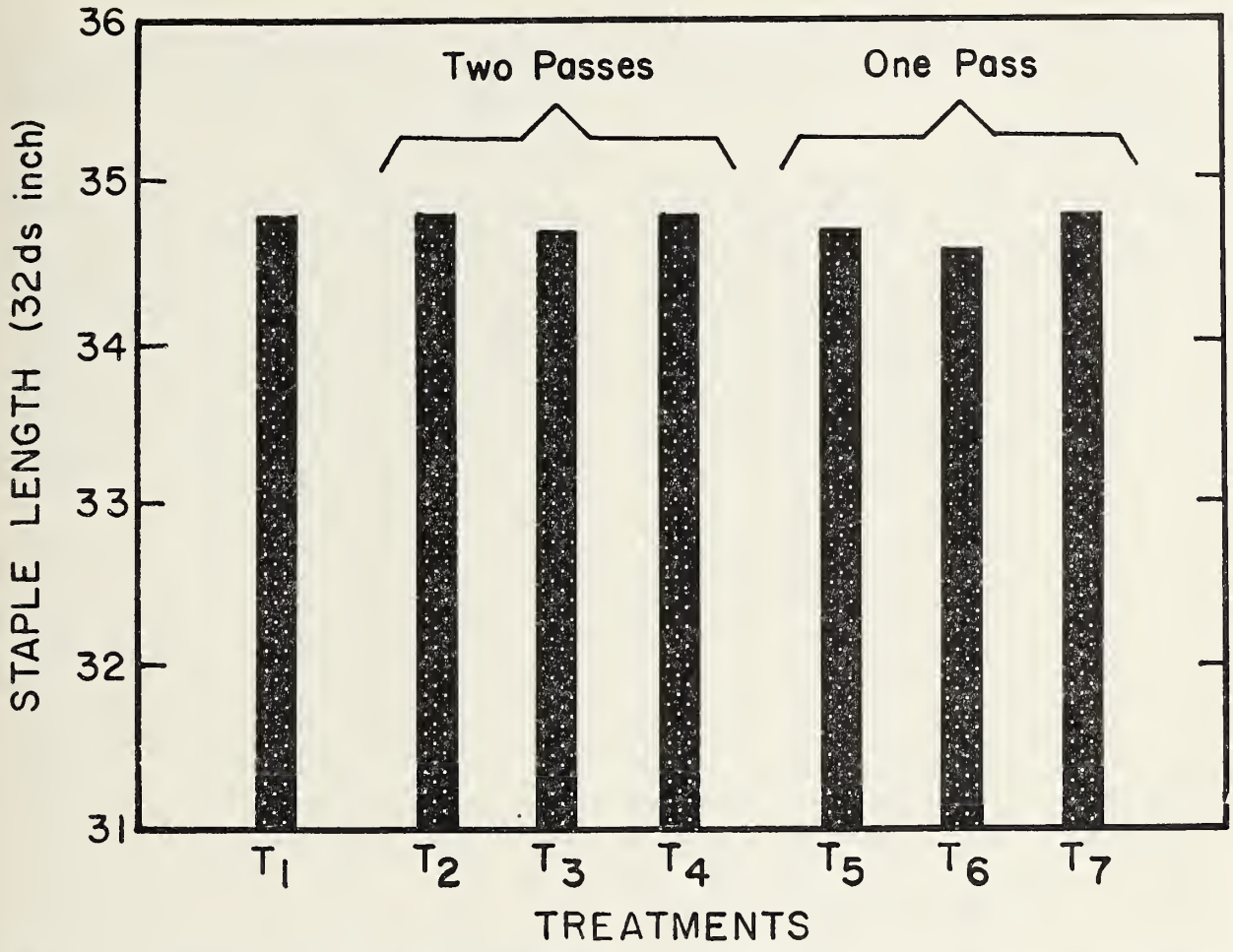

FIGURE 2.—The effects of temperature-exposure combinations in gin drying on the staple length of cotton—average of results obtained from three stations, 1960. The T_1 samples were exposed 3 to 16 seconds to drying air at ambient temperature. The other samples were passed through drier as shown under the following conditions: T_2 and T_5 at 210° F. for 3 seconds; T_3 and T_6 at 175° F. for 12 seconds; and T_4 and T_7 at 140° F. for 16 seconds.

compared with 33.9 for the dried treatments. This slight reduction would be expected when cotton of uniform moisture content is subjected to drying.

Staple lengths for combined locations attributable to drying and ginning treatments were virtually the same. They are all within a very narrow range, averaging slightly less than $1\frac{3}{32}$ inches (fig. 2).

Fiber and Spinning Tests

Fiber Length by Array Method

The upper quartile length was not consistently affected by the different ginning treatments (table 9). Differences between treatment in mean length and in coefficients of length variation were minor at all three stations. The cotton ginned with treatment T_2 at the Pee Dee Station had the lowest mean length, but the same treatment did not produce the lowest mean fiber length at the other two stations.

Fiber Strength and Fineness

Fiber strength tests were made on the Pressley tester for both zero and ⅛-inch gage (table 10). Only slight and inconsistent differences between treatments occurred in fiber strength for both gage lengths. Micronaire readings were essentially the same for all treatments within each station.

Nonlint Content (Shirley Analyzer)

The late-harvested lots, which were handpicked and ginned under ambient temperature (T_1), had the lowest nonlint content at the Clemson and Edisto Stations (table 11). However, all lots at the Pee Dee Station were handpicked, and the lots ginned under ambient con-

ditions did not have the lowest nonlint content. Differences in nonlint content between the other treatments (T_2 through T_7) were inconsistent at this station.

Manufacturing Waste

Manufacturing waste consisted of opener, picker, and card waste. At the Clemson and Edisto Stations, the late-harvested cotton, which was handpicked and ginned under ambient temperature (T_1), had less manufacturing waste than that ginned by the other treatments (table 11). The cotton ginned under ambient temperature at the Pee Dee Station, where all cotton was handpicked, had about the same percentage of waste as cotton ginned by the other treatments. Differences in manufacturing waste between the other treatments (T_2 through T_7) were inconsistent.

Neps

Differences in neps between treatments were very small at all stations (table 11). Early- and late-harvested cotton differed only slightly in neps.

Spinning End Breakage

With one exception, the cotton ginned under ambient temperature had fewer ends down per 1,000 spindle hours (EDMSH) than early- and late-harvested cotton ginned by the other treatments (table 12). At the Clemson and Pee Dee Stations, the EDMSH for the high-moisture lots (two passes through the drier with various temperature-exposure combinations) tended to be higher than for the medium-moisture lots (one pass through the drier with various temperature-exposure combinations). However, at the Edisto Station, no consistent trend existed in EDMSH between treatments T_2 through T_7.

TABLE 9.—*Effects of cotton ginning conditions on fiber length and length distribution as measured by the fiber array method (ginned lint), 1960*

Treatment No.[1]	Upper quartile length			Mean length			Coefficient of variation			Fibers ½-inch and shorter		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
Clemson Station:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
T_1	1.24	1.23	1.24	1.04	1.02	1.03	29	30	30	8.2	8.5	8.4
T_2	1.26	1.26	1.26	1.06	1.05	1.06	27	29	28	6.7	8.3	7.5
T_3	1.26	1.26	1.26	1.06	1.04	1.05	28	30	29	7.4	8.3	7.8
T_4	1.26	1.26	1.26	1.07	1.06	1.06	28	29	28	7.4	8.0	7.7
T_5	1.26	1.26	1.26	1.07	1.06	1.06	27	29	28	6.8	8.2	7.5
T_6	1.28	1.26	1.27	1.07	1.05	1.06	28	30	29	6.8	8.5	7.6
T_7	1.25	1.27	1.26	1.07	1.04	1.06	27	30	28	6.2	9.0	7.6
Edisto Station:												
T_1	1.32	1.25	1.28	1.12	1.03	1.08	26	31	28	5.9	9.7	7.8
T_2	1.27	1.29	1.28	1.07	1.06	1.06	28	30	29	6.8	8.0	7.4
T_3	1.29	1.26	1.28	1.08	1.05	1.06	28	30	29	7.7	9.0	8.4
T_4	1.29	1.26	1.28	1.08	1.04	1.06	28	30	29	7.1	8.5	7.8
T_5	1.30	1.26	1.28	1.08	1.02	1.05	29	33	31	7.7	10.3	9.0
T_6	1.31	1.25	1.28	1.09	1.03	1.06	29	32	30	7.5	9.4	8.4
T_7	1.30	1.25	1.28	1.11	1.02	1.06	26	32	29	5.5	9.6	7.6
Pee Dee Station:												
T_1	1.23	1.21	1.22	1.00	.99	1.00	33	31	32	10.8	10.0	10.4
T_2	1.21	1.20	1.20	.96	.93	.94	35	37	36	12.0	14.8	13.4
T_3	1.21	1.20	1.20	.97	.95	.96	34	35	34	12.6	13.1	12.8
T_4	1.21	1.22	1.22	.97	.98	.98	34	34	34	12.0	11.5	11.8
T_5	1.23	1.22	1.22	1.00	.99	1.00	33	32	32	11.3	11.1	11.2
T_6	1.21	1.19	1.20	.98	.96	.97	34	33	34	11.6	11.6	11.6
T_7	1.21	1.19	1.20	.99	.95	.97	33	34	34	10.8	12.4	11.6

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

TABLE 10.—*Effects of cotton ginning conditions on Pressley strength measurements and on Micronaire reading for ginned lint, 1960*

Source and treatment No.[1]	Pressley—"0" gage (1000 p.s.i.)			Pressley—⅛-inch gage (Index)			Micronaire fineness (Reading)		
	Early season	Late season	Aver-age	Early season	Late season	Aver-age	Early season	Late season	Aver-age
Clemson Station:									
T_1	76. 5	77. 0	76. 8	2. 83	3. 03	2. 93	4. 6	4. 4	4. 5
T_2	76. 1	73. 5	74. 8	3. 03	2. 86	2. 94	4. 7	4. 5	4. 6
T_3	74. 3	72. 5	73. 4	2. 95	2. 90	2. 92	4. 8	4. 5	4. 6
T_4	73. 0	72. 3	72. 6	2. 98	2. 87	2. 92	4. 6	4. 5	4. 6
T_5	74. 1	73. 7	73. 9	2. 96	3. 08	3. 02	4. 8	4. 4	4. 6
T_6	72. 9	70. 3	71. 6	3. 04	2. 97	3. 00	4. 7	4. 3	4. 5
T_7	75. 6	72. 3	74. 0	3. 04	3. 01	3. 02	4. 7	4. 4	4. 6
Edisto Station:									
T_1	75. 6	74. 8	75. 2	3. 01	2. 99	3. 00	4. 0	4. 2	4. 1
T_2	77. 5	74. 4	76. 0	2. 98	3. 01	3. 00	4. 2	4. 0	4. 1
T_3	75. 7	73. 7	74. 7	2. 98	2. 82	2. 90	4. 2	4. 0	4. 1
T_4	74. 2	73. 3	73. 8	3. 26	3. 02	3. 14	4. 1	4. 0	4. 1
T_5	73. 3	71. 1	72. 2	3. 09	2. 85	2. 97	4. 0	4. 0	4. 0
T_6	72. 5	70. 7	71. 6	3. 21	2. 99	3. 10	4. 0	4. 0	4. 0
T_7	74. 3	72. 6	73. 4	3. 23	2. 85	3. 04	4. 0	4. 0	4. 0
Pee Dee Station:									
T_1	72. 0	71. 5	71. 8	2. 94	2. 76	2. 85	3. 7	4. 0	3. 9
T_2	71. 3	69. 7	70. 5	2. 86	2. 74	2. 80	3. 8	3. 9	3. 8
T_3	71. 1	70. 6	70. 8	2. 98	2. 74	2. 86	3. 9	3. 9	3. 9
T_4	73. 0	69. 3	71. 2	2. 90	2. 88	2. 89	3. 8	3. 9	3. 9
T_5	71. 2	72. 0	71. 6	2. 95	2. 68	2. 82	4. 0	3. 8	3. 9
T_6	69. 0	72. 0	70. 5	2. 85	2. 62	2. 74	3. 7	3. 8	3. 7
T_7	70. 8	70. 7	70. 8	2. 89	2. 72	2. 80	3. 9	4. 0	3. 9

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; and T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

Break Factor

At the Clemson and Edisto Stations, the break factor increased as the temperature decreased for cotton passed twice through the drier (table 12). At the Pee Dee Station, the break factor was not consistently affected by the temperature for cotton passed twice through the drier. At all three stations, with one exception, the break factor was higher for lots ginned with ambient temperature (T_1) than with lots ginned at 210° F. and passed twice through the drier (T_2).

Yarn Appearance

At the Edisto and Pee Dee Stations, lots that passed through the drier once tended to have a higher appearance index than did lots that passed through the drier twice (table 12). All other differences in yarn appearance between treatments were very small and inconsistent.

TABLE 11.—*Effects of cotton ginning conditions on waste and neps per 100 square inches for ginned lint, 1960*

Source and treatment No.[1]	Shirley Analyzer total waste			Manufacturing waste			Neps/100 square inches of card web		
	Early season	Late season	Average season	Early season	Late season	Average season	Early season	Late season	Average season
Clemson Station:	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Number*	*Number*	*Number*
T_1	4. 2	3. 5	3. 85	5. 48	5. 74	5. 61	2	4	3
T_2	4. 7	6. 1	5. 40	7. 85	9. 46	8. 66	3	4	4
T_3	4. 1	5. 0	4. 55	7. 85	8. 91	8. 38	3	5	4
T_4	4. 4	6. 6	5. 50	7. 86	9. 07	8. 46	5	4	4
T_5	4. 2	4. 5	4. 35	7. 20	8. 68	7. 94	4	4	4
T_6	4. 6	4. 4	4. 50	7. 41	8. 17	7. 79	3	4	4
T_7	4. 9	6. 4	5. 65	7. 50	8. 40	7. 95	3	4	4
Edisto Station:									
T_1	3. 7	3. 5	3. 60	5. 63	5. 49	5. 56	4	4	4
T_2	3. 6	7. 1	5. 35	5. 51	7. 78	6. 64	5	7	6
T_3	4. 0	5. 1	4. 55	6. 64	7. 62	7. 13	5	5	5
T_4	3. 7	5. 6	4. 65	5. 54	8. 58	7. 06	5	4	4
T_5	3. 8	5. 4	4. 60	6. 21	7. 93	7. 07	4	5	4
T_6	3. 7	5. 3	4. 50	6. 56	8. 14	7. 35	4	5	4
T_7	4. 0	5. 8	4. 90	6. 52	8. 38	7. 45	4	5	4
Pee Dee Station:									
T_1	4. 2	4. 2	4. 20	6. 73	6. 85	6. 79	4	5	4
T_2	3. 0	2. 8	2. 90	5. 96	7. 64	6. 80	4	8	6
T_3	2. 7	3. 2	2. 95	5. 91	6. 99	6. 45	4	7	6
T_4	2. 8	3. 2	3. 00	5. 96	6. 66	6. 31	4	8	6
T_5	3. 0	3. 7	3. 35	5. 95	6. 48	6. 22	3	6	4
T_6	3. 5	3. 5	3. 50	6. 48	6. 52	6. 50	5	5	5
T_7	3. 9	4. 5	4. 20	6. 42	6. 91	6. 66	4	4	4

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; and T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

TABLE 12.—*Spinning test results, 1960*

Source and treatment No.[1]	Corrected EDMSH [2]			Yarn size, actual			Break factor 40s			Yarn appearance		
	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average	Early season	Late season	Average
Clemson Station:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Units*	*Units*	*Units*	*Index*	*Index*	*Index*
T_1	42	43	42	42.75	41.86	42.30	1923	1928	1926	110	110	110
T_2	112	143	128	40.63	40.55	40.59	1931	1699	1815	120	110	115
T_3	125	148	136	39.93	39.84	39.88	1970	1799	1884	110	110	110
T_4	98	115	106	40.33	40.08	40.20	2056	1924	1990	130	110	120
T_5	58	139	98	40.43	40.56	40.50	2057	1945	2001	110	110	110
T_6	56	97	76	40.59	41.96	41.28	1993	1966	1980	110	110	110
T_7	66	127	96	40.02	40.49	40.26	2040	1967	2004	130	110	120
Edisto Station:												
T_1	33	60	46	41.24	41.20	41.22	2259	2011	2135	110	90	100
T_2	32	95	64	43.14	41.33	42.24	2117	1962	2040	100	100	100
T_3	39	68	54	41.00	40.84	40.92	2170	1994	2082	90	100	95
T_4	43	103	73	41.41	40.35	40.88	2260	2048	2154	100	90	95
T_5	34	122	78	41.88	39.38	40.63	2302	1967	2134	110	100	105
T_6	45	85	65	41.89	40.85	41.37	2276	1802	2039	100	110	105
T_7	41	134	88	40.53	39.69	40.11	2362	1868	2115	110	100	105
Pee Dee Station:												
T_1	45	57	51	40.72	40.43	40.58	1877	1773	1825	100	100	100
T_2	81	266	174	39.84	39.66	39.75	1761	1555	1658	90	90	90
T_3	62	278	170	40.27	39.92	40.10	1690	1531	1610	90	90	90
T_4	69	82	76	40.61	40.38	40.50	1671	1579	1625	80	90	85
T_5	69	85	77	39.73	38.59	39.16	1788	1752	1770	90	90	90
T_6	74	99	86	39.98	39.86	39.92	1620	1724	1672	100	90	95
T_7	77	80	78	39.80	40.86	40.33	1732	1634	1683	100	90	95

[1] T_2 received 2 passes and T_5, 1 pass through drier at 210° F. for 3 seconds; T_3 received 2 passes and T_6, 1 pass through drier at 175° F. for 12 seconds; and T_4 received 2 passes and T_7, 1 pass through drier at 140° F. for 16 seconds.

[2] Corrected EDMSH means ends down per 1,000 spindle-hours corrected to yarn size.

APPENDIX

TABLE 13.—*Supplemental moisture and ginning data on test lots of cotton processed at Clemson—machine picked, early season, 1960*

Item	Treatment No.						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Drier temperature, inlet—° F	70	210	175	140	210	175	140
Shelves in tower drier—number	24	0	12	24	0	12	24
Passes through drier—do	1	2	2	2	1	1	1
Ambient air temperature, ginning—° F	70	81	80	75	79	75	73
Ambient relative humidity, ginning—percent	45	49	51	62	50	61	65
Initial seed cotton moisture—do	12. 2	18. 1	16. 0	16. 2	11. 0	11. 2	11. 6
Initial fiber moisture—do	8. 0	10. 7	10. 0	10. 4	8. 2	9. 1	8. 8
Seed moisture, ginning—do	11. 8	16. 1	15. 6	16. 0	11. 3	12. 2	12. 0
Trash content of lint—do	3. 2	4. 8	4. 7	4. 9	4. 8	5. 0	5. 2
Lint reflectance, colorimeter—R_d	72. 6	68. 0	69. 0	68. 8	68. 9	68. 7	68. 7

TABLE 14.—*Supplemental moisture and ginning data on test lots of cotton processed at Clemson—machine picked, late season, 1960*

Item	Treatment No.						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Drier temperature, inlet—° F	65	210	175	140	210	175	140
Shelves in tower drier—number	0	0	12	24	0	12	24
Passes through drier—do	1	2	2	2	1	1	1
Ambient air temperature, ginning—° F	65	72	70	66	65	64	62
Ambient relative humidity, ginning—percent	62	45	46	54	61	63	66
Initial seed cotton moisture—do	8. 2	17. 3	14. 7	16. 5	13. 3	13. 1	14. 1
Initial fiber moisture—do	6. 8	10. 2	10. 0	9. 8	9. 2	10. 0	10. 1
Seed moisture, ginning—do	9. 5	16. 0	14. 6	14. 6	14. 6	14. 1	14. 5
Trash content of lint—do	3. 5	6. 9	6. 1	6. 6	6. 2	5. 8	6. 2
Lint reflectance, colorimeter—R_d	73. 0	67. 2	69. 4	68. 7	69. 0	70. 0	69. 5

TABLE 15.—*Supplemental moisture and ginning data on test lots of cotton processed at Edisto—hand snapped, early season, 1960*

Item	Treatment No.						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Drier temperature, inlet—° F	84	210	175	140	210	175	140
Shelves in tower drier—number	24	0	12	24	0	12	24
Passes through drier—do	1	2	2	2	1	1	1
Ambient air temperature, ginning—° F	84	88	88	78	80	79	76
Ambient relative humidity, ginning—percent	55	49	49	66	58	60	65
Initial seed cotton moisture—do	9. 0	12. 3	12. 7	13. 2	11. 3	11. 0	11. 9
Initial fiber moisture—do	7. 0	9. 2	9. 5	9. 8	8. 5	8. 4	8. 9
Seed moisture, ginning—do	9. 2	11. 5	11. 4	12. 2	11. 3	10. 8	12. 9
Trash content of lint—do	3. 5	3. 3	3. 4	3. 4	3. 9	4. 0	4. 2
Lint reflectance, colorimeter—R_d	74. 7	73. 8	74. 2	74. 2	74. 0	73. 3	74. 3

TABLE 16.—*Supplemental moisture and ginning data on test lots of cotton processed at Edisto—hand snapped, late season, 1960*

Item	Treatment No.						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Drier temperature, inlet ° F	83	210	175	140	210	175	140
Shelves in tower drier number	0	0	12	24	0	12	24
Passes through drier do	1	2	2	2	1	1	1
Ambient air temperature, ginning ° F	83	83	82	75	82	80	76
Ambient relative humidity, ginning percent	48	51	50	63	49	51	54
Initial seed cotton moisture do	7.5	15.0	14.9	14.9	9.4	10.0	9.8
Initial fiber moisture do	6.2	10.3	9.6	9.7	7.1	7.7	7.2
Seed moisture, ginning do	8.5	13.7	13.3	13.8	8.7	10.1	9.6
Trash content of lint do	3.8	5.7	5.2	6.1	6.0	5.9	6.3
Lint reflectance, colorimeter R_d	73.1	70.4	71.6	71.2	70.5	70.9	70.8

TABLE 17.—*Supplemental moisture and ginning data on test lots of cotton processed at Pee Dee—hand-picked, early season, 1960*

Item	Treatment No.						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Drier temperature, inlet ° F	45	210	175	140	210	175	140
Shelves in tower drier number	24	0	12	24	0	12	24
Passes through drier do	1	2	2	2	1	1	1
Ambient air temperature, ginning ° F	45	61	57	51	63	57	53
Ambient relative humidity, ginning percent	50	48	37	42	45	38	56
Initial seed cotton moisture do	11.2	10.8	12.0	11.2	11.2	11.2	9.9
Initial fiber moisture do	9.4	8.1	7.7	7.5	8.0	8.4	8.5
Seed moisture, ginning do	11.3	10.0	10.6	10.2	10.4	10.9	10.0
Trash content of lint do	4.1	3.6	3.3	3.5	3.7	3.8	4.3
Lint reflectance, colorimeter R_d	73.7	74.5	74.2	74.4	74.3	74.3	73.3

TABLE 18.—*Supplemental moisture and ginning data on test lots of cotton processed at Pee Dee—hand-picked, late season, 1960*

Item	Treatment No.						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Drier temperature at inlet ° F	63	210	175	140	210	175	140
Shelves in tower drier number	24	0	12	24	0	12	24
Passes through drier do	1	2	2	2	1	1	1
Ambient air temperature, ginning ° F	63	73	70	65	76	75	73
Ambient relative humidity, ginning percent	46	31	37	42	43	40	46
Initial seed cotton moisture do	13.0	12.7	12.5	13.3	13.2	13.0	13.0
Initial fiber moisture do	9.8	7.9	8.0	8.9	8.8	8.7	9.0
Seed moisture, ginning do	13.4	11.1	11.6	12.3	12.9	13.0	12.6
Trash content of lint do	5.0	4.7	4.3	4.4	4.8	4.7	5.5
Lint reflectance, colorimeter R_d	69.3	69.1	69.3	70.2	69.4	69.6	67.7

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